Public Comments – Best Management Practices

Comments of Bud Hoekstra

Best Management Practices, or BMPs, is a legal term that appears in CZARA, the Clean Water Act, EPA Regulatory documents and in the Calaveras County Code, and I want to draw your attention to the confusion generated by different meanings of the same term. The Government Linguistics Act in the California Government Code regulates the use of technical terms, and SGMA has a technical usage of BMP that differs from the legal definitions in other codes, and this regulatory confusion of terms will cause hardships for the people who are regulated by GSAs within the state.

For illustration, I have attached pages from the EPA's textbook for regulators, NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE. Appendix A, page 10-281, lists NRCS ***BMPs*** with their code numbers – some have changed numbers, others have changed titles, e.g. "Use Exclusion" is now "Access Control." Page 3-33 is a chart that explores ***groundwater*** ***BMPs***. Note the disparity between how the EPA uses BMP and SGMA uses BMP.

I would like the difference in definitions duly noted in the SGMA Best Management Practices document, because BMP will have two usages and two meanings. Farmers, for example, need to know there are two contrasting regulatory frameworks that must be reconciled in their paperwork for the Water Boards.

I will add another example. The Calaveras County Code incorporates a DESIGN MANUAL FOR GRADING, DRAINAGE AND EROSION CONTROL which anyone can google on the web. Scroll to the appendix in the DESIGN MANUAL and read the definition of BMP. The Calaveras County Code, section 15.05.080 I, states "Grading or other earthwork activities when carried out in conjunction with a use associated with, related to or in support of an agricultural operation on agricultural land … shall incorporate the use of ***best management practices***, as recognized by UC Extension and the Natural Resources Conservation Service …".

It would be nice if the use of the term BMP were more uniform in its use, but it's not uniform, and the SGMA document should highlight the differences in the terms BMP and BMP for people who take the BMPs on paper and put them on the ground.

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Management Practices

Management practices are implemented on agricultural lands for a variety of purposes, including protecting water resources, protecting terrestrial or aquatic wildlife habitat, and protecting the land resource from degradation by wind, salt, and toxic levels of metals. The primary focus of this guidance is on agricultural management practices that control the generation and delivery of pollutants into water resources or remediate or intercept pollutants before they enter water resources.

NRCS maintains a National Handbook of Conservation Practices (USDA–NRCS, 1977), updated continuously, which details nationally accepted management practices. These practices can be viewed at the USDA-NRCS web site at *www.ncg.nrcs.usda.gov/practice_stds.html*. In addition to the NRCS standards, many States use locally determined management practices that are not reflected in the NRCS handbook. Readers interested in obtaining information on management practices used in their area should contact their local Soil and Water Conservation District or local USDA office. Two very helpful handbooks for farmers in the Midwest are *60 Ways Farmers Can Protect Surface Water* (Hirschi et al., 1997), and *50 Ways Farmers Can Protect their Ground Water* (Hirschi et al., 1993).

How Management Practices Work to Prevent Nonpoint Source Pollution

Management practices control the delivery of nonpoint source (NPS) pollutants to receiving water resources by

- minimizing pollutants available (source reduction);
- retarding the transport and/or delivery of pollutants, either by reducing water transported, and thus the amount of the pollutant transported, or through deposition of the pollutant; or
- remediating or intercepting the pollutant before or after it is delivered to the water resource through chemical or biological transformation.

Management practices can minimize the delivery and transport of agriculturally derived pollutants to surface and ground waters. Although a wide variety of BMPs are available, all require regular inspection and maintenance.

Management practices are generally designed to control a particular pollutant type from specific land uses. For example, conservation tillage is used to control erosion from irrigated or non-irrigated cropland. Management practices may also provide secondary benefits by controlling other pollutants, depending on how the pollutants are generated or transported. For example, practices which reduce erosion and sediment delivery often reduce phosphorus losses since phosphorus is strongly adsorbed to silt and clay particles. Thus, conservation tillage not only reduces erosion, but also reduces transport of particulate phosphorus.

In some cases, a management practice may provide environmental benefits beyond those linked to water quality. For example, riparian buffers, which reduce phosphorus and sediment delivery to water bodies, also serve as habitat for many species of birds and plants.

Control of surface transport may increase leaching of pollutants.

Sometimes, however, management practices used to control one pollutant may inadvertently increase the generation, transport, or delivery of another pollutant. Conservation tillage, because it creates increased soil porosity (i.e., large pore spaces), may increase nitrate leaching through the soil, particularly when the amount and timing of nitrogen application is not part of the management plan. Tile drains, used to reduce runoff and increase soil drainage, can also have the undesirable effect of concentrating and delivering nitrogen directly to streams (Hirschi et al., 1997). In order to reduce the nitrogen pollution caused by tile drains, other management practices, such as nutrient management for source reduction and biofilters that are attached to the outflow of the tile drains for interception, may be needed. On the other hand, practices which reduce runoff may contribute to reduced in-stream flows, which have the potential to adversely impact habitat. Therefore, management practices should only be chosen after a thorough evaluation of their potential impacts and side-effects.

Water Quality Effects of USDA-NRCS Practices

USDA-NRCS conservation practices can be structural (e.g., Waste Treatment Lagoons; Terraces; Sediment Basins; or Fences) or agronomic (e.g., Prescribed Grazing; Nutrient Management; Pest Management; Residue Management; or Conservation Cover.) Not all USDA-NRCS conservation practices are applicable in all areas of the United States. When and where applicable, their effects on water quality may vary based on many factors. Some of these factors include climate, soils, topography, geology, existing cultural and management activities, as well as modifications made to the practice standards that govern how the practices are to be applied in local settings.

Guidance identifying expected effects of USDA-NRCS conservation practices has been prepared and is being kept up to date by discipline and resource specialist in each state. Technical guidance for water quality effects is found in the Conservation Practice Physical Effects (CPPE) documents in Section V of the NRCS Field Office Technical Guide (FOTG). Table 3-1 is a simplified table developed from the CPPE in the Oregon FOTG Section V. This table shows the kind of information available at the local level that can be used to help evaluate the effects of specific conservation practices. For example, in the area for which this guidance was prepared it has been determined that Contour Buffer Strips (NRCS Practice Code 332) can be expected to have beneficial effects on surface water quality, but because the practice increases infiltration it can be expected to have detrimental effects on ground water quality.

Management Measures

Management measures are defined under section 6217 of CZARA as:

> economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint source control practices, technologies, processes, siting criteria, operating methods, or other alternatives.

The management measures specified by EPA for section 6217 contain performance expectations and, in many cases, specific actions that are to be taken to prevent or minimize nonpoint source pollution (EPA, 1993a). For example, the performance expectations for erosion and sediment control for agriculture are "to minimize the delivery of sediment from agricultural lands to surface waters" or "to settle the settleable solids and associated pollutants in runoff delivered from the contributing area for storms up to and including a 10-year, 24-hour frequency." Individual management practices or specific actions needed to achieve these performance expectations are not included in the management measure statement. The management measure for pesticides, however, includes both performance expectations ("reduce contamination of surface water and ground water from pesticides") and specific practices and actions such as anti-backflow devices on hoses, and calibration of pesticide spray equipment. Thus, in most cases, there is considerable flexibility to determine *how* to best achieve the performance expectations for EPA's section 6217 management measures.

EPA's six management measures for agriculture are described in Chapter 4.

Management Practices

"Best" management practices, BMPs, are designed to reduce the quantities of pollutants that are generated at and/or delivered from a source to a receiving water body. In EPA's guidance for section 6217, the term *management practice* is used in lieu of *BMPs* since "best" can be a highly subjective and site-specific label. For example, the BMP manuals used by States to implement the Clean Water Act section 319 program are not identical although much consistency exists across States. Even within States, a practice may be considered best in one area (e.g., coastal plain) but inappropriate in another area (e.g., mountains). Criteria for determining what is best may include extent of pollution prevention or pollutant removal, ease of implementation, ease of maintenance and operation, durability, attractiveness to landowner (e.g., how willing will farmers be to implement the practice in a voluntary program?), cost, and cost-effectiveness. The relative importance assigned these and other criteria in judging what is best varies across States, within States, and among landowners, often for very good reasons (e.g., irrigation water management considerations are very different in western States with low rainfall and water rights laws, versus midwestern States with diminishing ground-water reserves, versus eastern States with plentiful rainfall and surface waters). For these reasons, this guidance is consistent with the section 6217 management measures guidance in its use of the term "management practice" rather than "BMP."

Management practices can be structural (e.g., waste treatment lagoons, terraces, or sediment basins) or managerial (e.g., rotational grazing, nutrient management, pesticide management, or conservation tillage). Management practices generally do not stand alone in solving water quality problems, but are used in combinations to build *management practice systems*. For example, soil testing is a good practice for nutrient management, but without estimates of realistic yield; good water management; appropriate planting techniques and timing; and proper nutrient selection, rates, and placement; the performance expectations for nutrient management cannot be achieved.

Each practice, in turn, must be selected, designed, implemented, and maintained in accordance with site-specific considerations to ensure that the practices function together to achieve the overall management goals. For example, a grassed waterway must be designed to handle all of the water that will be conveyed to it from upland areas, including all water re-routed with diversions and drainage pipes. Design standards and specifications must be compatible for practices to work together as effective systems.

A summary of agricultural management practices and how they function in systems is given in Chapter 3. Management practices that can be used to achieve each of the six agricultural management measures are described in Chapter 4.

Resource Management Planning Concepts

Resource management planning, also known as conservation planning, for agricultural operations is a natural resource problem solving and management process. The process integrates economic, social (including cultural resources), and ecological considerations to meet goals and objectives. It involves setting of personal, environmental, economic, and production goals for the farm or ranch. The challenge in resource management planning is to balance the short-term demands for production of food, fiber, wood, and other agricultural products, with long-term sustainability of a quality environment.

Resource management systems are combinations of conservation practices and resource management, identified by land or water uses, for the treatment of all natural resource concerns for soil, water, air, plants, and animals that meets or exceeds the quality criteria for resource sustainability. The quality criteria are described in the USDA Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG). See Appendix B for additional information on the FOTG.

A resource management plan for the farm serves to maintain quality of life while achieving goals for profitability and water quality.

Resource management planning is preferred by land managers who have a negative reaction to "single purpose plans" that address individual economic or natural resource issues. Essential goals for a farm or ranch resource management plan include:

- ❒ Improving or ensuring profitability by finding solutions that save money, increase sales, improve product quality, or simplify/reduce the work;
- ❒ Reducing water pollution through application of appropriate systems of management practices;

Table 3-1. **NRCS conservation practices, pollutants potentially controlled, and sources of pollutants (USDA-NRCS, 1977).**

	RESOURCE CONCERNS	Pesticides	Nutrients & Organic	Salinity	Heavy Metals	Pathogens	Pesticides	Nutrients & Organic	Salinity	Heavy Metals	Pathogens	Temperature	Low Dissolved Oxygen	Suspended Sediments & Turbidity	Aquatic Habitat Suitability
NRCS Code	CONSERVATION PRACTICES	Ground Water					Surface Water								
322	Channel Vegetation				B	B	B	B	B	B	B	B		B	B
327	Conservation Cover	D	B	B	B	B	B	B		B	B	B	B	B	B
656	Constructed Wetland						B	B	B	B	B		B		B
332	Contour Buffer Strips	D	D	D	D	D	B	B	B	B			B	B	B
342	Critical Area Planting	D	B	B	B	B	B	B	B	B	B	B	B	B	B
400	Floodwater Diversion	B	B				B	B	B	B	B	B	B	B	
490	Forest Site Preparation							D					D	D	D
412	Grassed Waterway						B	B					B	B	B
561	Heavy Use Area Protection						B	D						B	
422	Hedgerow Planting						B	B			B		B	B	
441	Irrigation System - Micro	B	B		B	B	B	B		B	B	B	B	B	B
442	Irrigation System - Sprinkler	D	D	D	D	D	B	B		B	B	B	B	B	B
634	Manure Transfer		B	B				B	B		B	B	B	B	
484	Mulching	D	D	D	D	D	B	B	B	B	B		B	B	
590	Nutrient Management		B	B	B	B		B	B	B			B		B
528A	Prescribed Grazing		B				B	B			B	B		B	B
344	Residue Management, Seasonal	D	D	D	D	D	B	B	B	B	B	B	B	B	B
391	Riparian Forest Buffer	B	B	B	B	B		B	B	B	B	B		B	B
350	Sediment Basin	D	D	B	D	D	B	B	B	B	B			B	B
351	Well Decommissioning	B	B	B	B	B									
657	Wetland Restoration						B	B			B		B	B	B
	B - Beneficial effects expected														
	D - Detrimental effects expected														
	Blank - Not Rated														

Table 3-1. NRCS conservation practices, pollutants potentially controlled, and sources of pollutants (USDA-NRCS, 1977).

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NRCS Code	CONSERVATION PRACTICES	Ground Water					Surface Water								
322	Channel Vegetation				B	B	B	B	B	B	B	B		B	B
327	Conservation Cover	D	B	B	B	B	B	B		B	B	B	B	B	B
656	Constructed Wetland						B	B	B	B	B		B		B
332	Contour Buffer Strips	D	D	D	D	D	B	B	B	B			B	B	B
342	Critical Area Planting	D	B	B	B	B	B	B	B	B	B	B	B	B	B
400	Floodwater Diversion	B	B				B	B	B	B	B	B	B	B	
490	Forest Site Preparation							D					D	D	D
412	Grassed Waterway						B	B					B	B	B
561	Heavy Use Area Protection						B	D						B	
422	Hedgerow Planting						B	B			B		B	B	
441	Irrigation System - Micro	B	B		B	B	B	B		B	B	B	B	B	B
442	Irrigation System - Sprinkler	D	D	D	D	D	B	B		B	B	B	B	B	B
634	Manure Transfer		B	B				B	B		B	B	B	B	
484	Mulching	D	D	D	D	D	B	B	B	B	B		B	B	
590	Nutrient Management		B	B	B	B		B	B	B			B		B
528A	Prescribed Grazing		B				B	B			B	B		B	B
344	Residue Management, Seasonal	D	D	D	D	D	B	B	B	B	B	B	B	B	B
391	Riparian Forest Buffer	B	B	B	B	B		B	B	B	B	B		B	B
350	Sediment Basin	D	D	B	D	D	B	B	B	B	B			B	B
351	Well Decommissioning	B	B	B	B	B									
657	Wetland Restoration						B	B			B		B	B	B

	B - Beneficial effects expected
	D - Detrimental effects expected
	Blank - Not Rated

Glossary

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10-year, 24-hour storm — A rainfall event of 24-hour duration and 10-year frequency that is used to calculate the runoff volume and peak discharge rate to a BMP.

25-year, 24-hour storm — A rainfall event of 24-hour duration and 25-year frequency that is used to calculate the runoff volume and peak discharge rate to a BMP.

ACP — Agricultural Conservation Program (the ACP is no longer an active USDA program; it was replaced by EQIP).

Adsorption — The adhesion of one substance to the surface of another.

Allelopathy — The inhibition of growth in one species of plants by chemicals produced in another species.

Animal unit (au) — A unit of measurement for any animal feeding operation calculated by adding the following numbers: the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 25 kilograms (approximately 55 pounds) multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0.

Aquifer — A saturated, permeable geologic unit of sediment or rock that can transmit significant quantities of water under hydraulic gradients.

ASCS — Agricultural Stabilization and Conservation Service of USDA (now called Farm Service Agency).

AUM — Animal unit month. A measure of average monthly stocking rate that is the tenure of one animal unit for a period of 1 month. With respect to the literature reviewed for the grazing management measure, an animal unit is a mature, 1,000-pound cow or the equivalent based on average daily forage consumption of 26 pounds of dry matter per day (Platts, 1990). Alternatively, an AUM is the amount of forage that is required to maintain a mature, 1,000-pound cow or the equivalent for a one-month period. See animal unit for the NPDES definition.

Best management practice (BMP) — A practice or combination of practices that are determined to be the most effective and practicable (including technological, economic, and institutional considerations) means of controlling point and nonpoint pollutants at levels compatible with economic and environmental quality goals.

BMP system — A combination of two or more individual BMPs into a "system" that functions to reduce the same pollutant.

Biochemical oxygen demand (BOD) — A quantitative measure of the strength of contamination by organic carbon materials.

FSA — Farm Service Agency, part of the U.S. Department of Agriculture.

Integrated Pest Management (IPM) — A pest population management system that anticipates and prevents pests from reaching damaging levels by using all suitable tactics including natural enemies, pest-resistant plants, cultural management, and the judicious use of pesticides, leading to an economically sound and environmentally safe agriculture.

Lateral — Secondary or side channel, ditch, or conduit.

Leachate — Liquids that have percolated through a soil and that contain substances in solution or suspension.

Management measures — As defined in section 6217(g)(5) of CZARA; "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint source control practices, technologies, processes, siting criteria, operating methods, and other alternatives."

MCL — Maximum contaminant level. The enforceable standard or number against which a system's treated water samples are judged for compliance with U.S. Environmental Protection Agency regulations.

Micronutrient — A plant nutrient found in relatively small amounts (<100 mg kg^{-1}) in plants. These are usually B, Cl, Cu, Fe, Mn, Mo, Ni, Co, and Zn.

Natural Resources Conservation Service (NRCS) — An agency of the U.S. Department of Agriculture.

Nitrogen (N) — An element occurring in manure and chemical fertilizer that is essential to the growth and development of plants, but which, in excess, can cause water to become polluted and threaten aquatic animals.

NPS pollution — Nonpoint source pollution; pollution originating from diffuse areas (land surface or atmosphere) having no well-defined source.

Nutrients — Elements or compounds essential as raw materials for organism growth and development, such as carbon, nitrogen, phosphorus, etc.

Pasture — Those improved lands that are primarily used for the production of adapted domesticated forage plants for livestock.

Phosphorus (P) — An element occurring in manure and chemical fertilizer that is essential to the growth and development of plants, but which, in excess, can cause water to become polluted and threaten aquatic animals.

Range — Those lands on which the native or introduced vegetation (climax or natural potential plant community) is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing use. Range includes natural grassland, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities.

Return flow — That portion or the water diverted from a stream that finds its way back to the stream channel either as surface or underground flow.

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Appendix

Appendix A: Best Management Practices — Definitions and Descriptions

Best management practices mentioned in this guidance are listed in alphabetical order below. This is not a complete list of all the management practices for agricultural nonpoint source pollution control; there are others that may be in use or are under development. The NRCS or other code number, if any, is given for each BMP, followed by a short definition. Additional explanatory text about selected BMPs is presented in italicized text below the practice, code, and definition.

Access Road (560): A travelway constructed as part of a conservation plan.
Access Control (472)

Animal Trails and Walkways (575): A livestock trail or walkway constructed to improve grazing distribution and access to forage and water.

Bedding (310): Plowing, blading, or otherwise elevating the surface of flat land into a series of broad, low ridges separated by shallow, parallel channels.

Brush Management (314): Removal, reduction, or manipulation of non-herbaceous plants.

Improved vegetation quality and the decrease in runoff from the practice will reduce the amount of erosion and sediment yield. Improved vegetative cover acts as a filter strip to trap the movement of dissolved and sediment attached substances, such as nutrients and chemicals from entering downstream water courses. Mechanical brush management may initially increase sediment yields because of soil disturbances and reduced vegetative cover. This is temporary until revegetation occurs.

Channel Vegetation (322): Establishing and maintaining adequate plants on channel banks, berms, spoil, and associated areas.

Chiseling and Subsoiling (324): Loosening the soil, without inverting and with a minimum of mixing of the surface soil, to shatter restrictive layers below normal plow depth that inhibit water movement or root development.

Composting Facility (317): A facility for the biological stabilization of waste organic material.

The purpose is to treat waste organic material biologically by producing a humus-like material that can be recycled as a soil amendment and fertilizer substitute or otherwise utilized in compliance with all laws, rules, and regulations.

this system allows the operator the opportunity to mange nutrients, wastewater and pesticides. For example, nutrients applied in several incremental applications based on the plant needs may reduce ground water contamination considerably, compared to one application during planting. Poor management may cause pollution of surface and ground water. Pesticide drift from chemigation may also be hazardous to vegetation, animals, and surface water resources. Appropriate safety equipment, operation and maintenance of the system is needed with chemigation to prevent accidental environmental pollution or backflows to water sources.

Irrigation System, Surface and Subsurface (443): A planned irrigation system in which all necessary water control structures have been installed for efficient distribution of irrigation water by surface means, such as furrows, borders, contour levees, or contour ditches, or by subsurface means.

Operation and management of the irrigation system in a manner which allows little or no runoff may allow small yields of sediment or sediment-attached substances to downstream waters. Pollutants may increase if irrigation water management is not adequate. Ground water quality from mobile, dissolved chemicals may also be a hazard if irrigation water management does not prevent deep percolation. Subsurface irrigation that requires the drainage and removal of excess water from the field may discharge increased amounts of dissolved substances such as nutrients or other salts to surface water. Temperatures of downstream water courses that receive runoff waters may be increased. Temperatures of downstream waters might be decreased with subsurface systems when excess water is being pumped from the field to lower the water table. Downstream temperatures should not be affected by subsurface irrigation during summer months if lowering the water table is not required. Improved aquatic habitat may occur if runoff or seepage occurs from surface systems or from pumping to lower the water table in subsurface systems.

Irrigation System, Tailwater Recovery (447): A facility to collect, store, and transport irrigation tailwater for reuse in the farm irrigation distribution system.

The reservoir will trap sediment and sediment-attached substances from runoff waters. Sediment and chemicals will accumulate in the collection facility by entrapping which would decrease downstream yields of these substances.

Salts, soluble nutrients, and soluble pesticides will be collected with the runoff and will not be released to surface waters. Recovered irrigation water with high salt and/or metal content will ultimately have to be disposed of in an environmentally safe manner and location. Disposal of these waters should be part of the overall management plan. Although some ground water recharge may occur, little if any pollution hazard is usually expected.

Irrigation Water Conveyance, Ditch and Canal Lining, Flexible Membrane (428B): A fixed lining of impervious material installed in an existing or newly constructed irrigation field ditch or irrigation canal or lateral.

Irrigation Water Conveyance, Ditch and Canal Lining, Galvanized Steel (428C): A fixed lining of impervious material installed in an existing or newly constructed irrigation field ditch or irrigation canal or lateral.